

Atty. Dkt. No. 200209179-1IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

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1 1. (Canceled)

1 2. (Currently Amended) A method of determining a placement of services of a  
2 distributed application onto nodes of a distributed resource infrastructure comprising  
3 the steps of:  
4 establishing an application model of the services comprising transport  
5 demands between the services;  
6 establishing an infrastructure model of the nodes comprising transport  
7 capacities between the nodes;  
8 forming an integer program that comprises:  
9 a set of placement variables for a combination of the services and the  
10 nodes, each of the placement variables indicating whether a particular service  
11 is located on a particular node;  
12 communication constraints between node pairs which ensure that a sum of  
13 the transport demands between a particular node pair does not exceed the  
14 transport capacity between the particular node pair, each term of the sum  
15 comprising a product of a first placement variable, a second placement  
16 variable, and the transport demand between the services associated with the  
17 first and second placement variables; and  
18 an objective; and  
19 employing a local search solution to solve the integer program which  
20 determines the placement of the services onto the nodes, wherein the services are  
21 assigned to the nodes according to a previous assignment and further comprising  
22 assessing reassignment penalties for placements of the services that differ from  
23 the previous assignments.

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1 3. (Canceled)

1 4. (Original) The method of claim 2 wherein the objective comprises minimizing  
2 communication traffic between the nodes.

1 5. (Original) The method of claim 2 wherein the application model further  
2 comprises processing demands for the services.

1 6. (Original) The method of claim 5 wherein the infrastructure model further  
2 comprises processing capacities for the nodes.

1 7. (Original) The method of claim 6 wherein the integer program further comprises  
2 processing constraints which ensure that a sum of the processing demands for each of  
3 the nodes does not exceed the processing capacity for the node.

1 8. (Original) The method of claim 7 wherein the objective comprises minimizing  
2 communication traffic between the nodes and balancing the processing demands on  
3 the nodes.

1 9. (Original) The method of claim 6 wherein the processing demands and the  
2 processing capacities are normalized according to a processing criterion.

1 10. (Original) The method of claim 9 wherein the processing criterion comprises an  
2 algorithm speed.

1 11. (Original) The method of claim 9 wherein the processing criterion comprises a  
2 transaction speed.

1 12. (Original) The method of claim 9 wherein the processing capacities of the nodes  
2 are found according to a look-up table in which different types of nodes have been  
3 normalized according to the processing criterion.

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- 1 13. (Original) The method of claim 2 wherein the application model further  
2 comprises storage demands for the services.
- 1 14. (Original) The method of claim 13 wherein the infrastructure model further  
2 comprises storage capacities for the nodes.
- 1 15. (Original) The method of claim 14 wherein the integer program further  
2 comprises storage constraints which ensure that a sum of the storage demands for  
3 each of the nodes does not exceed the storage capacity for the node.
- 1 16. (Original) The method of claim 2 wherein the integer program further comprises  
2 placement constraints which ensure that each of the services is placed on one and  
3 only one of the nodes.
- 1 17. (Canceled)
- 1 18. (Canceled)
- 1 19. (Currently Amended) The method of claim 2[[18]] wherein the integer program  
2 further comprises a second objective that seeks to minimize the reassignment  
3 penalties.
- 1 20. (Canceled)
- 1 21. (Canceled)
- 1 22. (Currently Amended) A computer readable memory comprising computer code  
2 for directing a computer to make a determination of a placement of services of a  
3 distributed application onto nodes of a distributed resource infrastructure, the  
4 determination of the placement of the services onto the nodes comprising the steps of:

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5           establishing an application model of the services comprising transport  
6 demands between the services;  
7           establishing an infrastructure model of the nodes comprising transport  
8 capacities between the nodes;  
9           forming an integer program that comprises:  
10           a set of placement variables for a combination of the services and the  
11 nodes, each of the placement variables indicating whether a particular service  
12 is located on a particular node;  
13           communication constraints between node pairs which ensure that a sum of  
14 the transport demands between a particular node pair does not exceed the  
15 transport capacity between the particular node pair, each term of the sum  
16 comprising a product of a first placement variable, a second placement  
17 variable, and the transport demand between the services associated with the  
18 first and second placement variables; and  
19           an objective; and  
20           employing a local search solution to solve the integer program which  
21 determines the placement of the services onto the nodes, wherein the services are  
22 assigned to the nodes according to a previous assignment and further comprising  
23 assessing reassignment penalties for placements of the services that differ from  
24 the previous assignments.

1   23.   (Canceled)

1   24.   (Original) The computer readable memory of claim 22 wherein the objective  
2   comprises minimizing communication traffic between the nodes.

1   25.   (Original) The computer readable memory of claim 22 wherein the application  
2   model further comprises processing demands for the services.

1   26.   (Original) The computer readable memory of claim 25 wherein the infrastructure  
2   model further comprises processing capacities for the nodes.

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1 27. (Original) The computer readable memory of claim 26 wherein the integer  
2 program further comprises processing constraints ensure that a sum of the processing  
3 demands for each of the nodes does not exceed the processing capacity for the node.

1 28. (Original) The computer readable memory of claim 27 wherein the objective  
2 comprises balancing the processing demands on the nodes.

1 29. (Original) The computer readable memory of claim 26 wherein the processing  
2 demands and the processing capacities are normalized according to a processing  
3 criterion.

1 30. (Original) The computer readable memory of claim 29 wherein the processing  
2 criterion comprises an algorithm speed.

1 31. (Previously Presented) The computer readable memory of claim 29 wherein the  
2 processing criterion comprises a transaction speed.

1 32. (Previously Presented) The computer readable memory of claim 29 wherein the  
2 processing capacities of the nodes are found according to a look-up table in which  
3 different types of nodes have been normalized according to the processing criterion.

1 33. (Original) The computer readable memory of claim 22 wherein the application  
2 model further comprises storage demands for the services.

1 34. (Original) The computer readable memory of claim 33 wherein the infrastructure  
2 model further comprises storage capacities for the nodes.

1 35. (Original) The computer readable memory of claim 34 wherein the integer  
2 program further comprises storage constraints which ensure that a sum of the storage  
3 demands for each of the nodes does not exceed the storage capacity for the node.

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1 36. (Original) The computer readable memory of claim 22 wherein the integer  
2 program further comprises placement constraints which ensure that each of the  
3 services is placed on one and only one of the nodes.

1 37. (Canceled)

1 38. (Canceled)

1 39. (Currently Amended) The computer readable memory of claim 22[[38]] wherein  
2 the integer program further comprises a second objective that seeks to minimize the  
3 reassignment penalties.

1 40. (Canceled)